WHAT IS CLAIMED IS:

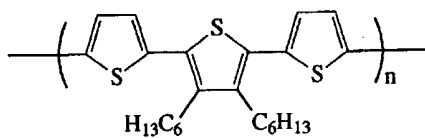1.   Polythiophenes of the formula
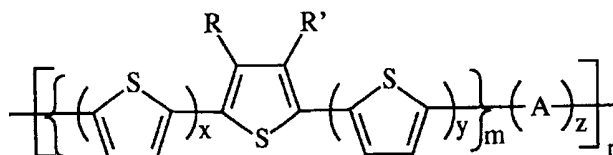
wherein R and R' are side chains; A is a divalent linkage; x and y represent the number of unsubstituted thienylene untis; z is 0 or 1, and wherein the sum of x and y is greater than zero; m represents the number of segments; and n represents the degree of polymerization.
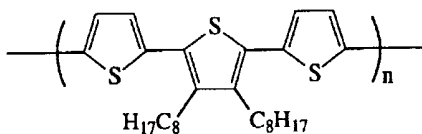
2.   A polythiophene in accordance with claim 1 wherein said side chains R, and R' are independently selected from the group consisting of alkyl, alkyl derivatives of alkoxyalkyl; siloxy-substituted alkyl, perhaloalkyl and polyether; said A is an alkylene or arylene optionally of phenylene, biphenylene, phenanthrenylene, dihydrophenanthrenylene, fluorenylene, oligoarylene, methylene, polymethylene, dialkylmethylene, dioxyalkylene, dioxyarylene, or oligoethylene oxide; and n is from about 5 to about 5,000.

3.   A polythiophene in accordance with **claim 1** wherein the number average molecular weight (M_n) of the polythiophenes is from about 2,000 to about 100,000 and the weight average molecular weight (M_w) is from about 4,000 to about 500,000, both as measured by gel permeation chromatography using polystyrene standards.
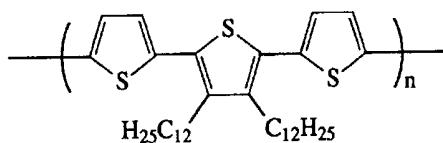
4. A polythiophene in accordance with **claim 1** wherein said polythiophene is (1), (2), (3), (4), (5), or (6)
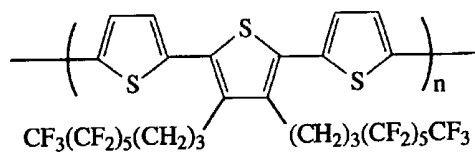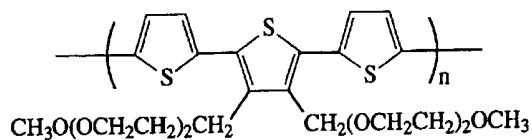
$$\left(\!\!\begin{array}{c}\text{thiophene}\!-\!\text{thiophene}\!-\!\text{thiophene}\\ \quad H_{13}C_6 \qquad C_6H_{13}\end{array}\!\!\right)_n$$

(1)

$$\left(\!\!\begin{array}{c}\text{thiophene}\!-\!\text{thiophene}\!-\!\text{thiophene}\\ \quad H_{17}C_8 \qquad C_8H_{17}\end{array}\!\!\right)_n$$

(2)

$$\left(\!\!\begin{array}{c}\text{thiophene}\!-\!\text{thiophene}\!-\!\text{thiophene}\\ \quad H_{25}C_{12} \qquad C_{12}H_{25}\end{array}\!\!\right)_n$$

(3)

$$\left(\!\!\begin{array}{c}\text{thiophene}\!-\!\text{thiophene}\!-\!\text{thiophene}\\ \quad CF_3(CF_2)_5(CH_2)_3 \qquad (CH_2)_3(CF_2)_5CF_3\end{array}\!\!\right)_n$$

(4)

$$\left(\!\!\begin{array}{c}\text{thiophene}\!-\!\text{thiophene}\!-\!\text{thiophene}\\ \quad CH_3O(OCH_2CH_2)_2CH_2 \qquad CH_2(OCH_2CH_2)_2OCH_3\end{array}\!\!\right)_n$$

(5)

$$\left(\!\!\begin{array}{c}\text{thiophene}\!-\!\text{thiophene}\!-\!\text{thiophene}\\ \quad (CH_3)_3SiOCH_2CH_2 \qquad CH_2CH_2OSi(CH_3)_3\end{array}\!\!\right)_n$$
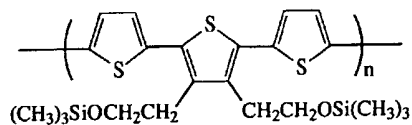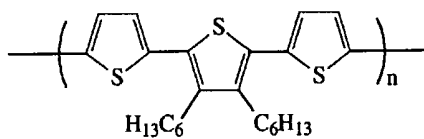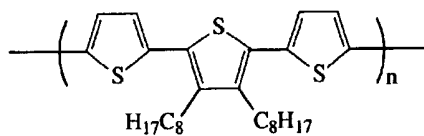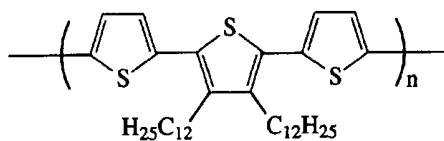
(6)

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5.   A polythiophene in accordance with **claim 1** wherein said polythiophene is (1), (2), or (3)

$$\left(\!\!\left[\text{thiophene}-\text{thiophene}(C_6H_{13})(H_{13}C_6)-\text{thiophene}\right]\!\!\right)_n$$

H13C6   C6H13

(1)

H17C8   C8H17
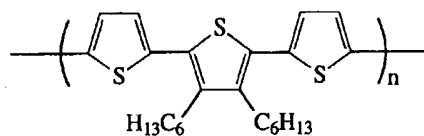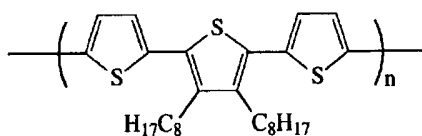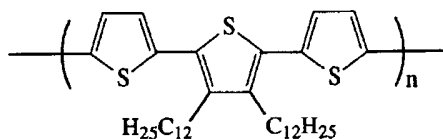
(2)

H25C12   C12H25

(3)

6. A polythiophene in accordance with **claim 1** represented

by

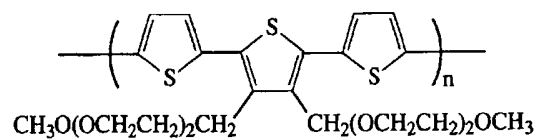

(1)
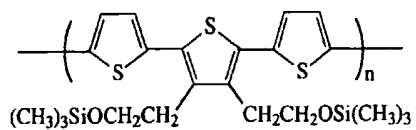

(2)

(3)

(4)

(5)

$(CH_3)_3SiOCH_2CH_2$ $CH_2CH_2OSi(CH_3)_3$

(6)

$H_{15}C_7$ C_7H_{15}

(7)

$H_{21}C_{10}$ $C_{10}H_{21}$

(8)

$C_{10}H_{21}$ $C_{10}H_{21}$

(9)

$CF_3(CF_2)_5(CH_2)_3$ $(CH_2)_3(CF_2)_5CF_3$

(10)

C_8H_{17} C_8H_{17}

C_8H_{17} C_8H_{17}

(11)

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$$CH_3O(OCH_2CH_2)_2CH_2 \qquad CH_2(OCH_2CH_2)_2OCH_3$$

(12)

$$H_{25}C_{12} \qquad C_{12}H_{25}$$

(13)
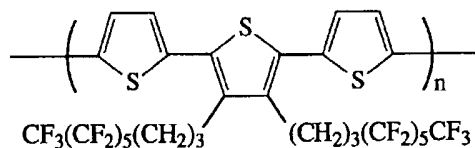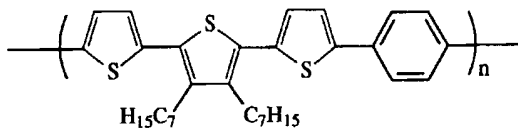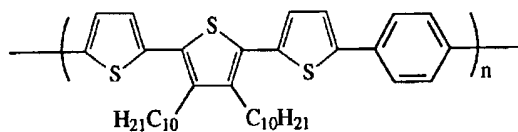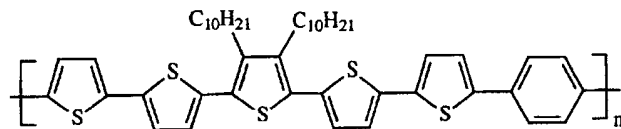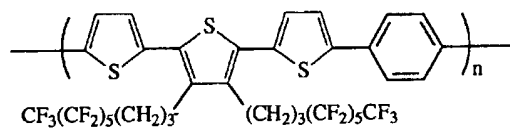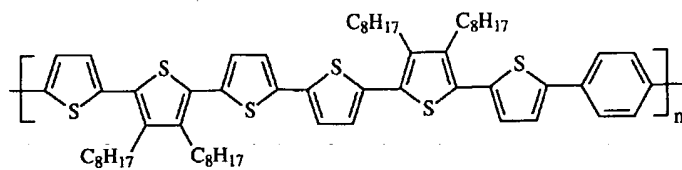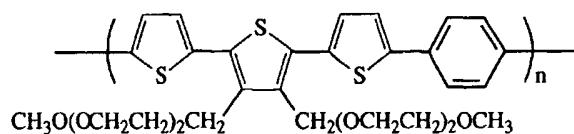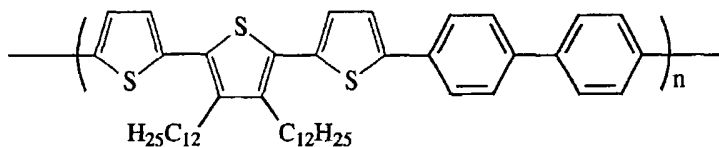
$$H_{13}C_6 \qquad C_6H_{13}$$

(14)

7.   A polythiophene in accordance with **claim 1** wherein x is a number of from zero to about 10, z is zero or 1, and m is from 1 to about 5.

8.   A polythiophene in accordance with **claim 1** wherein x is a number of from about 1 to about 7, z is zero or 1, m is from 1 to about 5, and n is from about 5 to about 3,000.

9.   A polythiophene in accordance with **claim 2** wherein said polyhaloalkyl is a perfluoroalkyl.

10. A polythiophene in accordance with **claim 1** wherein M_w for said polythiophene is from about 5,000 to about 100,000, M_n is from about 4,000 to about 50,000; said side chain is alkyl with from about 1 to about 25 carbon atoms, or alkoxy with from 1 to about 25 carbon atoms, and A is an arylene.
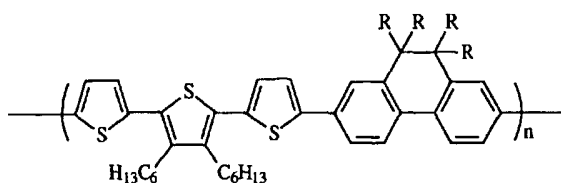
11. A polythiophene in accordance with **claim 1** wherein said R and R' contain from about 3 to about 20 carbon atoms.

12. A polythiophene in accordance with **claim 1** wherein R and R' are independently selected from the group consisting of alkyl, alkyl derivatives of alkoxyalkyl; siloxy-substituted alkyl, perhaloalkyl of perfluoroalkyl and polyether; A is selected from the group consisting of arylene of phenylene, biphenylene, phenanthrenylene, dihydrophenanthrenylene, fluorenylene, dioxyalkylene, and dioxyarylene.

13. A polythiophene in accordance with **claim 1** wherein said R and R' are independently selected from the group consisting of propyl, butyl, pentyl, hexyl, heptyl, octyl, nonyl, decyl, undecyl, dodecyl, tridecyl, tetradecyl, pentadecyl, and isomers thereof.

14. A polythiophene in accordance with **claim 1** wherein R and R' are selected from the group consisting of hexyl, heptyl, octyl, nonyl, decyl, undecyl, dodecyl, tridecyl, tetradecyl, and pentadecyl; A is selected from the group consisting of phenylene, biphenylene, and fluorenylene; x and y are each independently a number of from zero to about 10; and m is a number of from 1 to about 5.
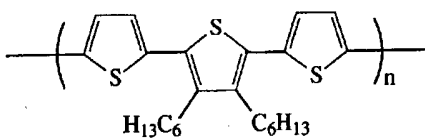
15.   A polythiophene in accordance with **claim 1** wherein n is from about 5 to about 5,000; the number average molecular weight (M_n) of the polythiophene is from about 2,000 to about 100,000; weight average molecular weight (M_w) is from about 4,000 to about 500,000, both as measured by gel permeation chromatography using polystyrene standards.

16.   A polythiophene in accordance with **claim 1** wherein A is phenylene, biphenylene, or fluorenylene.
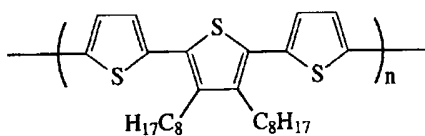
17.   A polythiophene in accordance with **claim 1** wherein n is from about 5 to about 5,000.

18.   A polythiophene in accordance with **claim 1** wherein n is from about 10 to about 1,000.

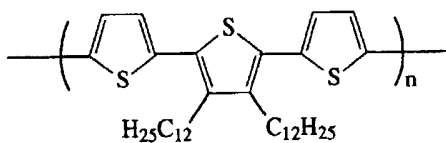19. A polythiophene in accordance with **claim 1** wherein said polythiophene is selected from the group consisting of polythiophenes of Formulas (1) through (8)

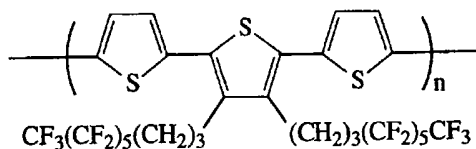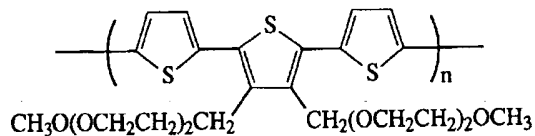$H_{13}C_6 \quad C_6H_{13}$

(1)

$H_{17}C_8 \quad C_8H_{17}$

(2)

$H_{25}C_{12} \quad C_{12}H_{25}$

(3)

$CF_3(CF_2)_5(CH_2)_3 \quad (CH_2)_3(CF_2)_5CF_3$

(4)

$CH_3O(OCH_2CH_2)_2CH_2 \quad CH_2(OCH_2CH_2)_2OCH_3$

(5)

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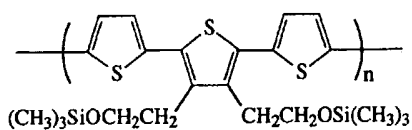
(6)

(7)

(8)

20.   A polythiophene in accordance with **claim 1** wherein x, y and m are from 1 to 3, and z is 0 or 1.

21.   A polythiophene in accordance with **claim 1** wherein x, y and m are 1, and z is 0 or 1.

22.   A polythiophene in accordance with **claim 1** wherein x, y are from 0 to 3, m is from 1 to 3, and z is 0 or 1.

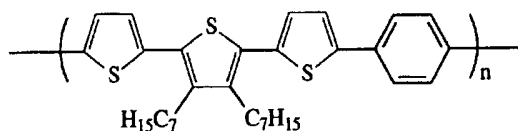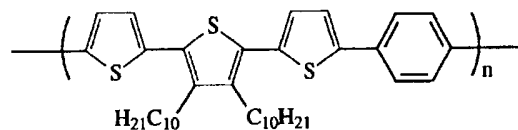23.   A polythiophene in accordance with **claim 1** wherein x, y and m are 1, and z is 0.

24.   A polythiophene in accordance with **claim 1** wherein M_n is from about 4,000 to about 50,000, and M_w is from about 5,000 to about 100,000.

25.   A polythiophene in accordance with **claim 1** wherein the sum of x and y is from about 1 to about 10.

26.   A polythiophene in accordance with claim 1 wherein the sum of x and y is from about 1 to about 5.

27.   A polythiophene in accordance with claim 1 wherein n is from about 10 to about 1,000, and m is from about 1 to about 5.
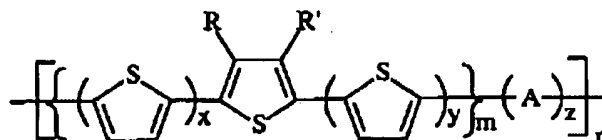
Application No. 10/042,359

processes thereof and uses thereof illustrated in these copending applications may be selected for the present invention in embodiments thereof.--

IN THE CLAIMS:

Please substitute the amended Claims 1, 2, 7, 8, 14, 20, 21, 22, 23, 25, and 26 for pending Claims 1, 2, 7, 8, 14, 20, 21, 22, 23, 25, and 26 as follows:

1.   (Amended) Polythiophenes of the formula

wherein R and R' are side chains; A is a divalent arylene linkage; x and y represent the number of unsubstituted thienylene untis; z is 1, and wherein the sum of x and y is greater than about 2; m represents the number of segments; and n represents the degree of polymerization.

2.   (Amended) A polythiophene in accordance with claim 1 wherein said side chains R, and R' are independently selected from the group consisting of alkyl, alkyl derivatives of alkoxyalkyl; siloxy-substituted alkyl, perhaloalkyl and polyether; said A is phenylene, biphenylene, phenanthrenylene, dihydrophenanthrenylene, fluorenylene; and n is from about 5 to about 5,000.

7.   (Amended) A polythiophene in accordance with claim 1 wherein x is a number of from 1 to about 10, and m is from 1 to about 5.

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8.   (Amended) A polythiophene in accordance with **claim 1** wherein x is a number of from about 1 to about 7, m is from 1 to about 5, and n is from about 5 to about 3,000.

14.   (Amended) A polythiophene in accordance with **claim 1** wherein R and R' are selected from the group consisting of hexyl, heptyl, octyl, nonyl, decyl, undecyl, dodecyl, tridecyl, tetradecyl, and pentadecyl; A is selected from the group consisting of phenylene, biphenylene, and fluorenylene; x and y are each independently a number of from 2 to about 10; and m is a number of from 1 to about 5.

20.   (Amended) A polythiophene in accordance with **claim 1** wherein x, y and m are from 1 to 3.

21.   (Amended) A polythiophene in accordance with **claim 1** wherein x, y and m are 1.

22.   (Amended) A polythiophene in accordance with **claim 1** wherein x, y are from 0 to 3, and m is from 1 to 3.

23.   (Amended) A polythiophene in accordance with **claim 1** wherein x, y and m are 1.

25.   (Amended) A polythiophene in accordance with **claim 1** wherein the sum of x and y is from about 2 to about 10.

26.   (Amended) A polythiophene in accordance with **claim 1** wherein the sum of x and y is from about 3 to about 5.

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